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The Clinical Diagnosis of Pregnancy in Bovines*

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A matter of fifteen to twenty years ago, a good deal of interest was aroused in the treatment of sterility in cattle, chiefly through the teaching of Neilsen, of Copenhagen, who visited this country about that time. The interest seemed to be temporary, however; a number of practitioners tried this treatment, with apparently only fair results and as time went on most of them finally gave it up, though in some instances the treatment was persevered with and finally mastered.

As with many new methods of treatment, it was no doubt used indiscriminately as a cure for sterility of all kinds and far too much was expected of it. It is perhaps on account of this that sterility treatment was given up by many and was looked on with suspicion even by those who had never tried it. Latterly there has been a re-awakening of interest in the subject, and even more recently, the recommendations of the Survey Committee have given an added stimulus. This scheme has had many criticisms levelled against it, and I do not propose to discuss the other conditions with which it sets out to deal, but with sterility, certainly, much can be done. Anyone with experience of present-day dairy practice knows full well the great loss in milk and cow flesh which occurs through this scourge, which in some parts of the country gives rise to greater loss than any other cattle disease.

It is not for me to criticise this lack of interest displayed by many people. Many scorn the treatment completely, generally without foundation; others take what might be described as a luke-warm interest, while there is a small minority of active enthusiasts. My own opinion is that sterility is one of the most interesting conditions met with in practice, and apart from its interest and its importance to the farming community, treatment of it can become a valuable source of income. I am acquainted with a practitioner in the South who assures me that if he lost his sterility work his income would drop by 50 per cent. This practitioner has been treating animals for years; his clients realise that he can be relied upon to do good work, and this branch of his practice has come to stay. I am sure the day will come when the treatment of infertility in both cattle and horses will be widespread throughout the country instead of being localised, as it is at present, to districts within reach of a comparatively small number of men. If every preventable case of infertility could be successfully dealt with, then the Survey Committee would have justified its existence.

There is no need to stress the importance of the diagnosis of pregnancy in connection with the treatment of sterility. It is of primary importance, and everyone who intends taking up this work should be thoroughly conversant with the technique. Without this knowledge and experience grievous mistakes in diagnosis and treatment are bound to occur.

It is a fact that farmers and dairymen in most parts of the country have a firm belief that it is impossible to say with certainty whether an animal is in calf or not until the later stages of pregnancy. The blame for this can only be laid at the door of their practitioner, whose only means of diagnosis in many cases is confined to ballottement or palpation of the foetus through the flank. Many a good animal has gone to the slaughterhouse with a foetus inside her on this account, and looking at the matter from the point of view of treatment for infertility, it is almost a certainty that numbers of animals have received an intra-uterine injection of iodine or some other substance, often unnecessarily, sometimes perhaps disastrously.

It was in view of the importance of having a practical knowledge of the handling of the genitalia of the cow per rectum that, a year ago, I commenced classes for fifth-year students of this College at a dairy farm near Edinburgh. In the limited time at my disposal it is, of course, impossible to turn out experts, but this class had at least the result of making the men enthusiastic and anxious to learn more, and I am certain many of them will continue to add to their knowledge whenever opportunity occurs.

One of the chief difficulties in instructing a large class in this work is the fact that only a small number can be taken on at a time. In many cases, after the animal has been examined once or twice, the rectum becomes atonic, ballooned and stretched, rendering palpation of the various parts difficult and in some cases impossible. These animals have to be left for a few minutes. Before, and for some time after commencing this class, I had fears that so much handling, especially by more or less inexperienced people, might have disastrous results. These fears proved to be quite unfounded. Animals settle down immediately afterwards and in some cases do not even stop feeding during the examination.

In this paper I propose to confine my remarks principally to the handling of the genitalia per rectum. This method is without doubt the most reliable means of diagnosis and I shall only refer briefly to the other signs which, though usually not reliable by themselves, are often of considerable value when taken together.

To begin with, the non-appearance of blood at the vulva after service (taken by some as indicating that conception has occurred) is unreliable. Blood, generally small in amount, is said to appear within three days of service if the animal has not conceived. Neither can cessation of oestrus, the sign most relied on by breeders, be depended upon from our point of view. It must also be remembered that one may meet with cases where conception has occurred and the animal still comes into season, but as far as my experience goes these cases are uncommon. The presence of a uterine seal is generally given as a sign of pregnancy, but *per se* it cannot be relied upon, since in a number of cases it cannot be demonstrated in animals which are certainly pregnant. The palpation of a *corpus luteum* is of far more value, when considered with other signs, in animals which are examined at intervals. The palpation of the uterine arteries with the characteristic pulse in pregnancy is a valuable sign, and in most cases easily picked up. Auscultation of the foetal heart, as quoted in textbooks, can be definitely ruled out, as other and far more reliable signs are always available. The same may be said of palpation of the foetus *per vaginam*. Ballottement or palpation through the flank is valuable in the later stages.

The remaining clinical method is palpation of the uterus and foetus per rectum, and, before I go further, it might be well to explain that no one need think that he can become proficient by merely reading up the subject. The most I can do in a paper such as this is to give hints which would help a beginner. It should be realised that there are quite appreciable differences in the genitalia of different animals—not only in non-pregnant but also in pregnant animals at the same stage of pregnancy. The ease or otherwise with which the uterus can be palpated also depends a great deal on the age, condition, size or breed. To describe each condition met with would not only lead to confusion, but would be impracticable. Practical experience is, therefore, absolutely necessary for any degree of accuracy in diagnosis, and fortunately, material to work on is within reach of everyone in country practice.

To those of you who have seen the Bayer film on the diagnosis of pregnancy and have not yet tried the technique, I might issue the warning that you may receive rather a shock on attempting the method. The film leads one to believe that it is all quite simple, due to the fact that the operator's hand, in many of the processes, is shown free in the abdominal cavity, without the rectum intervening to complicate matters. Nevertheless, the film is of undoubted value to the beginner.

To begin with, I strongly advise the thorough examination of the normal, healthy, non-pregnant uterus. During the examination little or no restraint is necessary. An assistant may stand alongside the animal and at the same time hold the tail, or the operator may hold up the tail with one hand and examine with the other; this, by the way, is an advantage in that it allows a closer approach to the anus. Only in exceptional cases is it necessary to have an animal held by the nose.

*Address to the Scottish Metropolitan Division N.V.M.A., meeting in Edinburgh on October 25th, 1941.

The operator, provided with a bucket of water and soap, lubricates his hand and arm and the anal region of the cow. Either hand may be used, but the left has been found most convenient. This hand is then inserted into the rectum. Straining, with contraction of the walls of the rectum, generally occurs at this stage. Allow the spasm to pass off before proceeding further and then clear the rectum of faeces. A good method of emptying is to insert the tips of the fingers into the anus only and then spread them out. The animal will then empty the rectum herself. Do not force the hand against any spasm, otherwise damage to the rectal mucosa is almost sure to occur, causing a harmless but undesirable haemorrhage.

Once the rectum is emptied, the cervix is now easily identified, lying on the floor of the pelvis in the middle line. Its shape, size and consistency should be noted, and there is never any difficulty in finding it. By moving the hand in a forward direction, one then encounters the bifurcation at the extremity. This is easily distinguished. By palpating with a finger on the dorsal surface one finds the groove between the two horns.

In the next step—palpation of the horns and ovaries—difficulty may be met with. In heifers, for example, the whole of the genitalia, cervix, horns and ovaries can be covered by the palm of the hand with the hand about 9 to 10 inches within the rectum, *i.e.*, with the anus an inch or so above the level of the wrist. I mention these measurements because there is a tendency for beginners to put the hand too far forwards. In many animals which have had calves, however, the horns may sweep forwards out of reach, but it is always possible to palpate the ovaries, although the finding of the ovaries may give more trouble to a beginner. The tendency, I find, is to search too high up in the pelvis. They are often misled in expecting to find both ovaries lying widely apart. More often they lie quite close together, and are low down in the pelvis, often almost level with or just above the level of the pelvic brim. In young animals there is never much difficulty. As a rule, I find that once a beginner has been able to find the ovaries in one or two cows, he can find them almost straight away later on. I do not permit students to use forceps to pull back the genitalia in cases where the horns are out of reach, but I find that the cervix and consequently the horns can be brought back into the pelvis, to a certain extent, by pushing a finger into the bifurcation and retracting per rectum. This brings the cervix back under the palm of the hand and it can be held there by pressure from above by the palm, thus leaving the fingers free to follow up the horns for comparison and examination. This comparison and examination I stress at this point, as it has an important bearing on the diagnosis of pregnancy in its earlier stages.

Other structures in the vicinity should be made out and examined. The Fallopian tubes cannot be detected in a sexually healthy animal and, in any case, do not concern us here. The middle uterine artery can be picked up and its character should be noted. Other structures, *e.g.*, the rumen and bladder, should also be identified.

As many non-pregnant, sexually healthy animals as possible should be examined until the operator is thoroughly proficient at finding and palpating the various parts. The examination of a number of different animals will also demonstrate individual variation in position and size, thus safeguarding against mistakes in diagnosis later on.

Pregnancy diagnosis by palpation of the uterus can be carried out in most cows with a fair degree of certainty by the end of the second month, *i.e.*, eight weeks after service ; in heifers, possibly a few weeks earlier. In some cows, however, unless one had other evidence and breeding history, there may be doubt at this stage ; no actual buiging of the pregnant horn can be made out, but on comparison with the non-pregnant horn it has become more firm and turgid and a slight enlargement with a tendency to straighten out can generally be detected. In heifers there may be quite marked change as early as this, but I am of the opinion that it takes about two months before any appreciable change can be noted. It is therefore advisable to take all other available signs, together with breeding history, before making a diagnosis. Between the second and third month the change is more marked, though not perhaps so much as one would expect, but by the end of the third month there should be no doubt. The horn may be palpated along its length if retracted. Towards the end of the third month, bulging at the point in the horn to which the foetus is attached can be made out, the rest of the horn is still firm, and by now there is no difficulty in differentiating between pregnant and non-pregnant horns, on comparing the two. The enlargement of the uterine arteries also begins to be appreciable about this time.

From the third month on, growth is rapid and by the fourth month a great change has taken place. Early in the fourth month the presence of fluids surrounding the foetus becomes evident, and later on the foetus itself can be palpated, not by grasping any part of it but by striking the uterus from the front and making the foetus rebound back on to the finger tips. By the end of this period the horn has enlarged enormously and is lying over the pelvic brim within the abdomen. This has the effect of pulling the cervix over the brim ; the point where it crosses the brim can be easily determined. The pregnant horn is now lying slightly to the right of the middle line and the uterine arteries can be found with ease.

In the earlier part of the fourth to fifth month period, cotyledons can be palpated and later parts of the foetus itself can be made out. Still later on, the foetus may drop out of reach of the operator's hand. In these cases it is generally possible to palpate cotyledons and, from what I have said previously, there is plenty of other evidence.

By the end of the sixth month, the foetus is lying in the right flank, near or on the abdominal floor, and may be palpable through the flank. This palpation of the foetus through the flank should not be looked on as entirely dependable. Negative results from palpation do not mean that the animal is non-pregnant, and a rectal examination should always be made in doubtful cases.

I might point out that in some animals—particularly the smaller breeds—it is possible to palpate the foetus per rectum right on to parturition. In all animals the foetus can be easily palpated per rectum just before parturition, and since it is at this stage that palpation *per vaginam* is sometimes suggested, I would certainly recommend rectal palpation in preference.

Finally, I should also like to express the opinion that to get the best possible results in the treatment of infertility, visits to the farm would have to be at far more frequent intervals than is suggested, *viz.*, every three months, as it is in the early diagnosis and treatment of infertility that we can help our clients most.

Discussion.

Mr. H. M. Wilson thanked Mr. Burgess for his lucid address which left little room for criticism. He would like to suggest as a useful lubricant a mixture of five parts of liquid paraffin and one part of dettol or pinol. He noticed that the speaker made no mention of the examination of vaginal mucus, which was glistening in non-pregnant cows but whiter and stickier in the case of animals in calf. He also noticed that Mr. Burgess did not advocate cervical retraction. He had found this to be a very useful and simple procedure.

Major Rabagliati wondered whether Mr. Burgess experienced any difficulty in persuading farmers to allow rectal examinations to be carried out on their stock. He noted that Mr. Burgess recommended the use of the left hand in preference to the right and he asked the speaker to explain why the left was preferable. He also enquired whether the presence of twins makes the pregnancy diagnosis more difficult in the early stages by upsetting the comparison between the two horns and whether Mr. Burgess could say if in his experience the foetus was present more frequently in one horn rather than in the other.

Major Spreull said that he had been using much the same procedure as that outlined by the speaker for several years with considerable success. He had difficulty, however, in two types of case—firstly, in differentiating between a two-months pregnant animal and a case of slight enlargement of the uterus due to endometritis without external discharge ; secondly, in differentiating between a mummified calf and a live calf at certain stages. He would be glad therefore of the speaker's advice on these types of case.

Sir Arthur Olver thanked the speaker for his lucid introduction to a very interesting discussion. He thought Mr. Burgess had proved clearly and conclusively the innocuous nature of rectal examination. If a cow could be examined by four or five students in turn without ill-effect, then an examination by an expert must be quite harmless.

Mr. P. Wilson described an interesting case of a mummified foetus found in a cow suffering from heart trouble and said that, like Major Spreull, he had difficulty in diagnosing a mummified foetus.

Captain Watt asked if there were no chemical tests which could be applied to the urine of the pregnant animal.

Mr. Sillars described a case he had seen at *post-mortem* of a thrombus in one of the blood vessels just at the rim of the pelvis with an oedematous condition round about. He wondered if such a condition would have interfered with the diagnosis of pregnancy.

Reply

Mr. Burgess, in reply, said that the type of lubricant advocated by Mr. Wilson was undoubtedly very useful, but he had found that for class purposes soap was quite effective and much cheaper, though it might be slightly irritant. He had left out the question of vaginal mucus, though Mr. Wilson's statement was quite correct and the change had proved useful as an aid to diagnosis in the mare. He had always avoided the use of forceps in his tutorial classes as he felt that continued and repeated retraction might not be good for the animals. In the case of a single examination there was, of course, no such objection to its use, but he got good results by pulling the cervix back per rectum. Naturally he used forceps when doing intra-uterine injections.

With regard to Major Rabagliati's query, he agreed that there was still a prejudice amongst many farmers against rectal examination, but his experience had shown it to be quite unfounded. His preference for the use of the left hand was associated with the fact that, at least in the later stages, the foetus tended to lie more to the right side and the left hand was thus more convenient. Bicornual twins were certainly more difficult to diagnose than single pregnancies at certain stages. He had no statistical evidence as to the incidence of the foetus in the respective horns.

Major Spreull's difficulties were very real ones, and he agreed that a slight endometritis would be very difficult to differentiate at two months if a persistent corpus luteum were also present. If, however, the animal was still showing oestrus regularly that would be a guide. He sympathised with both Major Spreull and Mr. Wilson in their difficulty over the mummified foetus. They might be helped by the absence of foetal fluids and in the later stages by the absence of movement. And, of course, a diagnosis of pregnancy in such a case was, strictly speaking, quite correct. One must remember also the possibility of a cow aborting after examination and thus negativing a perfectly correct diagnosis. Biological tests had not proved so satisfactory in cows as in the human and equine species, and there was no reliable chemical test which could be applied to urine.

In the case Mr. Sillars described it would have been perfectly possible to make a mistake unless one were very careful.

A Quick and Simple Chemical Test for Pregnancy in the Mare

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This method, introduced by Cuboni, is based on chemical detection of the presence of sex hormones, oestrogens, in the urine of pregnant mares. The method has been given a practical trial by me and my assistants since 1936 on a great number of mares in Poland. It has given positive results in practically every case of pregnancy more than four months advanced. It has given no false indications of pregnancy when pregnancy did not exist. Many other veterinary surgeons in Poland and in other countries on the continent have equal faith in it. Cuboni's very efficient and simple method has not hitherto been published in the veterinary papers in this country, therefore I am giving a detailed description of this method, so that veterinary surgeons may make use of it.

Advantages of this chemical test are: It demands very little time, it is quicker and cheaper than the biological methods, it requires only ordinary laboratory glassware, and can be carried out by a veterinary surgeon who has no special acquaintance with chemical or biological assay. The urine used for the method need not be fresh, and is suitable even when it is a week old; bacterial contamination of the urine does not interfere with the test, therefore the urine can be taken without a catheter and may be kept without special precautions. A small quantity of urine is sufficient (the recommended quantity of filtered urine is 15 ml., or half an ounce) and the time required to perform a single test is about 30 minutes, and less time per test when several examinations are made at once.

Not the least value of this method is that it permits the diagnosis of pregnancy to be made without rectal or vaginal manipulations, which are not always without danger for the mare or foal.

Disadvantages of the method: The test is not reliable in the early stage of pregnancy. After 100 days from conception, the diagnosis is correct in 90 per cent. of cases. The probability of correct diagnosis increases until the end of gestation. The test is 98 per cent. reliable after 120 days of pregnancy, and in almost 100 per cent. of cases diagnosis can be given correctly by the 150th day of gestation.

The following chemicals and apparatus are required: Two test tubes about 25 cm. or 10 inches high, 30 mm. or 1¼ inch diameter; separating funnel of about 60 ml. capacity, water bath, glass rod; benzene, concentrated hydrochloric acid, concentrated sulphuric acid; filter funnels and paper; small measuring cylinder.

Method:

1. Filter about 25 ml. of urine through filter paper.
2. To 15 ml. of filtered urine add 3 ml. of hydrochloric acid.
3. Keep the mixture in a boiling water-bath or saucepan of boiling water for ten minutes. Boiling urine takes on a very dark brown colour and gives off a strong smell resembling horse sweat; therefore if no fume cupboard is available the boiling should be done out of doors.
4. Cool down the mixture under running water.
5. Add 18 ml. of benzene and stir for one to two minutes. If foam is formed filter the mixture.
6. Pour the mixture into a separating funnel. After a few minutes the benzene will separate out above the urine. Open the tap of the separator and let out the urine and discard it. Close the tap. Pour carefully into the benzene-urine extract 10 ml. of sulphuric acid and gently rotate the separating funnel for one or two minutes. If foam is formed filter the mixture.
7. Five to fifteen minutes later, after the benzene has separated out to the top, open the tap and collect the sulphuric acid in a test tube.
8. Keep the test tube containing the sulphuric acid for five minutes in a water-bath at about 80° C. (180° F.) and afterwards cool under the tap.

Diagnosis

The reaction is positive (the mare is pregnant) when the test tube containing the sulphuric acid, looked at so that strong incident light (direct sunlight or electric light) coming from behind the observer, shows a fluorescent green colour. This indicates the presence of the sex-hormones, oestrogens.

The reaction is negative (the mare is not pregnant) if the sulphuric acid is brown or port-wine coloured, without fluorescence.

The reaction is doubtful if the acid has a brown-greenish colour. If a doubtful reaction is obtained a repeat test should be performed about a fortnight later.

It is good to keep two control samples, one positive from a mare known to be pregnant, and one negative from a barren mare, and to compare the reactions given by these with those given by the unknowns.

Modifications of Cuboni's method have been proposed but none has much importance. Among these modifications are the addition of ammonia (half the volume of sulphuric acid) to the benzene extract of urine; the use of a smaller amount of urine (5 ml.) and proportionally less of the other chemicals; use of cotton wool instead of a filter paper; use of other solvents instead of benzene; use of a water-bath at 100° C. instead 80° C.

General Comment

Stallion urine always gives a positive reaction.

This test is not applicable for pregnancy in cows because the oestrin in cow urine is in an inactive state.

From a practical point of view this method is superior to other methods if determination of pregnancy before four months of gestation is not required. It may be commended as a method that is easy to perform without the need to send a sample to a distant laboratory.

Weekly Wisdom

In a sense scientific research is a triumph over natural instinct, over that mean instinct that makes men sly and secretive, that makes a man keep knowledge to himself and use it slyly to his own advantage. The common enemies of science and socialism are secrecy, subterfuge and private gain. —H. G. Wells.

CLINICAL COMMUNICATION

Entero-Toxaemia in Goats

N. S. BARRON, PH.D., M.R.C.V.S.,
READING

The writer recently investigated an outbreak of disease in a herd of goats kept in good conditions. The features of the outbreak were such that it is felt their publication may interest workers who from time to time have lost animals from obscure causes.

Management.—The animals were kept in separate boxes in a warm, dry shed. They were allowed to run out together on a small short-grass paddock on most days, depending upon the weather. They were fed on meadow hay of good quality which was put into a rack in their stalls and about 1 lb. each of a mixture of linseed cake, flaked maize and bran.

Symptoms.—All three animals which died were described by the attendant as being "off colour" some hours before death. They appeared dull when first visited in the morning or noticed in the paddocks and so were kept, or brought, in. They lay down, refused to eat and appeared to be uneasy. Although breathing appeared to become more and more exaggerated, death occurred some hours later without any more distinct symptoms being noticed. Marked excitement, however, immediately preceding death, was noticed.

Post-mortem Changes.—All animals were in good condition, having ample abdominal fat. In all three cases there was inflammation of the fourth stomach and bowels, varying in intensity in the different parts. It was perhaps most intense in the caecum, where it was localised in patches as in the stomach in one case. There were small haemorrhages in the fat and adjacent tissue of the heart, more especially along the line of demarcation between the upper and lower chambers. In one case there were small blood splashings along the bases of the auricles. The kidneys were mottled and in one case were very soft, almost "pulpy."

Bacteriological Examination.—The tissues did not reveal the presence of any pathogens but a highly potent toxin was demonstrated in the filtrate of the contents of the small intestine by the intravenous inoculation of mice. The titre of the toxin was not determined but 0·2 c.c. caused death in less than 60 seconds. From the results of serum-immunisation tests carried out on mice the toxin was considered to be Type C.

Treatment.—Animals in prime condition seemed to be most susceptible, a state of affairs resembling that found in pulpy-kidney disease of lambs. All goats that were in the shed and therefore likely to become affected immediately received a dose of Epsom salts and had their rations—other than their hay—reduced by one-half for several days. Each was inoculated subcutaneously with a dose of 20 c.c. of a reliable brand of lamb dysentery serum. No further cases occurred for over a year but there has been one death since from the same cause.

Remarks.—Although on the whole, apart from *Br. melitensis* infection, which does not appear to exist in this country, the specific diseases of goats have not been extensively studied, the writer has learnt since the above evidence was forthcoming of the occurrence of several outbreaks of disease amongst goats, the cause of which was obscure. From some of the details received it seemed to him quite possible that a number of these outbreaks were the result of *Cl. welchii* infection.

Following the recent Milnathort Foal Show, Mr. John F. Watson, M.R.C.V.S., honorary secretary, was able to send £40 13s. to the Red Cross Agriculture Fund.

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A farmer who is also a butcher was sentenced to three months' imprisonment, fined £100, and ordered to pay 25 gns. costs by Bury Justices, for slaughtering three beasts and three pigs without licence or authority from the Ministry of Food. Notice of appeal was given.

ABSTRACTS

[OBSCURE POINTS IN PREGNANCY DIAGNOSIS. ROSENBERGER, G. (1941.) *Deuts. tierärztl. Wschr.* **41.** 501-504.]

A discussion of medico-legal aspects of law actions or potential law actions arising out of errors by veterinary surgeons in diagnosing pregnancy in cows. Three case records are given in which farmers bought cows which were alleged by the sellers to be due to calve very soon. When they went for about a month without doing so the new owners had them examined and then slaughtered on the strength of negative diagnosis. At slaughter they were found to be in more or less late pregnancy. The legal decisions are discussed, in the course of which discussion some points of general interest emerge.

Rosenberger declares that pregnancy in bovines can be diagnosed with certainty from the eighth week, though at that early stage an error does not matter greatly, as it would do during the last half of gestation (with regard to the farmer's economic interests). A table is given to show the correspondence between month of pregnancy and weight of the gravid uterus, as would be obtainable at slaughter: it is roughly as follows after conversion of the metric weights to pounds:—

	Weight of Gravid Uterus in lbs.		
Months	*Min.*	*Max.*	*Average.*
1	¾	1½	1⅛
2	1½	3½	2¼
3	2½	5½	3½
4	5	19	11½
5	21	39½	27¾
6	28½	45½	35
7	35	68	48½
8	59½	86	76
9	94	181	140

J. E.

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[THE pH OF VAGINAL MUCUS OF NORMAL AND STERILE DAIRY COWS. SMITH, S. E., and ASDELL, S. A. (1941.) *Amer. J. vet. Res.* **2.** 167.]

Acidity of the vaginal tract is often cited as a cause of sterility in cows. The authors examined a number of normal and functionally sterile cows, the latter being under treatment with various endocrine preparations in an attempt to restore fertility. A total of over 30 cows was examined, all being free from detectable disease of the sexual organs. The total covered some nymphomaniac and anaphrodisiac cows. Samples of mucus were collected and examined within an hour with a glass electrode. Saline washes from a few cows were compared with vaginal mucus, and vaginal mucus compared with cervical mucus in four cows after slaughter.

The *p*H of the secretions of normal and sterile cows was alkaline and except in two cases ranged from *p*H 7·0 to *p*H 8·0, averaging *p*H 7·9. Saline vaginal washings were more acid than mucus when the mucus ranged above *p*H 7·5. Vaginal *p*H varies during oestrus, being high during dioestrum and low during metoestrum. Large doses of oestrogenic hormone in four cows did not produce an acid vaginal reaction. The cervix is more acid than the vagina and the flowing away of the cervical mucus may account for the increase in vaginal acidity immediately following oestrus.

G. S.

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[DEFERRED MILKING—A METHOD OF HANDLING ACUTE STREPTOCOCCAL MASTITIS CASES. POUNDEN, W. D. (1941.) *Cornell vet.* **31.** 339-344.]

The author has shown that some strains of mastitis streptococci may rapidly produce changes in milk, including fall in *p*H, largely through breakdown of lactose to lactic acid. The "whey" which forms when these changes take place *in vitro* was found to be very irritant, whether or not previously heat sterilised, when injected into the udder, and the symptoms were chiefly those seen in natural cases of acute mastitis. Pounden considers that much of the syndrome of a mastitis attack may result from a similar change of the milk *in vivo*. It has been shown [Brown, Peterson & Gortner

(1936). *J. Dairy Sci.* **19**. 243] that suspension of milking leads to resorption of lactose. Pounden therefore considers the rational treatment of acute mastitis should be by deferred milking as by this means the quantity of milk and the concentration of lactose present are reduced. He cites the case of a cow with acute parenchymatous streptococcal mastitis treated by sulphanilamide and milked six times daily. Only temporary relief was afforded. A subsequent acute attack in the same quarter of this cow and in two quarters of another was treated by deferring milking until the inflammatory reaction subsided and the udder again became soft and pliable. Ten other mild cases and two severe attacks were similarly treated. All fourteen cases responded to treatment within three days. Most of the udders functioned normally when the cows freshened again. Treatment of an acute catarrhal mastitis was unsuccessful. The Hotis test was used as an indication of the shedding of streptococci during and after treatment. The streptococci concerned in all these cases produced little or no haemolysis when grown on blood-agar plates. The author has not tested this treatment for mastitis caused by strongly haemolytic strains.

C. V. W.

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[**CONTAGIOUS PLEURO-PNEUMONIA OF GOATS.** Longley, E. O. (1940.) *Indian J. vet Sci.* **2**. part 2. 127-197.]

The author describes an investigation of contagious pleuro-pneumonia of goats since 1937. Previous failures to passage the disease from field material preserved for transit in several ways are shown to have been due to the unusual fragility of the infective agent. This was overcome by inducing typical pneumonic lesions by intranasal insufflation of fresh material from infected goats killed for this purpose. Sheep were found to be susceptible to inoculation but no pneumonic lesions were set up by the intranasal insufflation technique. Neither bullocks, buffaloes, guinea-pigs, rabbits nor mice showed any reaction to inoculations.

The symptoms, course, pathology and histopathology of the goat disease are described. Longley suggests that the infective agent be classed in the new order Borrelomycetes proposed for the agents of bovine pleuro-pneumonia and agalactia of goats by Turner (*J. Bact. Path.*, 1935, **41**, 391) and that it be called *B. peri-pneumoniae capri*.

Contact transmission of the goat disease could not be induced and the exact natural mode of spread of the disease, which attains epizootic proportions in Madras Presidency, remains to be solved.

Vaccination in the ear by subcutaneous inoculation of fresh pneumonic material is shown to reduce the morbidity to later intranasal insufflation of similar material from about 75 to 5 per cent.

The article is copiously illustrated throughout and the main findings of all transmission experiments, etc., are tabulated and discussed.

C. V. W.

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[**BOVINE TYPE OF TUBERCULOSIS IN SHEEP.** Creech, G. T (1940.) *Amer. J. vet. Res.* **1**. 23.]

Tuberculosis in sheep is a comparatively rare disease and when such cases are investigated they are usually due to the avian type of tubercle bacillus. Out of 60 cases examined in one laboratory only one was considered to be of the bovine type. In this sheep lesions were found in the lymph glands and the liver, and miliary lesions in the lung. They were chronic in nature and partly calcified and very few acid-fast organisms could be found microscopically, but histologically they were typical of tuberculosis.

For typing purposes rabbits, guinea-pigs and chickens were inoculated, but on *post-mortem* examination only one rabbit was affected and in view of these indefinite findings the experiment was repeated on guinea-pigs and chickens using material obtained from the rabbit. These further pathogenicity tests gave results typical of the bovine type.

The peculiar result of the primary inoculation is considered by the author to be due to a reduction in the virulence of the organism by its passage through the sheep and to a return to the more normal virulence after passage through the rabbit.

G. J. G. H.

REVIEW

GLASGOW VETERINARY COLLEGE (INCORPORATED) 1862—1941

The Governors of the Glasgow Veterinary College have published a most interesting brochure on the history of the college since its foundation as a private institution by its first Principal, Professor James McCall, in 1862.

As claimed in the opening paragraph, the life of the college as set out in the brochure is indeed "mainly a blend of romance and success despite a fairly long chapter of State discouragement during which the college exhibited in a pronounced degree a will to survive. Its record, these vicissitudes notwithstanding, has been marked by uninterrupted usefulness, as it has maintained a regular flow of qualified recruits for the veterinary profession, numbers of whom have distinguished themselves in both private and public spheres."

The booklet contains reproductions of photographs of many, past and present, who have been closely associated with the life of the college, including its Founder (Principal James McCall), Principal Gaiger, and Dr. Whitehouse, the third and present Principal.

This History has been compiled and most excellently arranged by Mr. William Adair, and may be obtained free of cost by any graduate of the College on application to the Secretary, Mr. James Austin, M.A., LL.B.

G. H. W.

IN PARLIAMENT

Supplementary Votes for Expenditure on Agricultural Research

Agricultural Research Council

With the House in Committee of Supply, on February 4th, under the Chairmanship of Colonel Clifton Brown, on the Supplementary Estimate vote Class IV (Scientific Investigation), Captain Crookshank (Financial Secretary to the Treasury): This Vote* covers two different points. First, there was the decision by His Majesty's Government to give a new, a more important and an independent status to the Agricultural Research Council and, in fact, to bring it up to the status of the Department of Scientific and Industrial Research and the Medical Research Council. The need for research into many agricultural matters is so great, that if a change of status in that way helps to accomplish what is required, I am sure hon. Gentlemen will not see any objection to it. Those recommendations are being put into effect. One of the results of that is to change the source from which this council has been financed—the Development Commissioners have previously found the money—and to put it directly upon the Votes. That does not make much difference because, by and large, Parliament finances the Development Commissioners by grants in aid and this is merely putting this particular expenditure on to another Vote. It is a purely technical matter which arises as a result of raising the status of the Council.

Under the first sub-Head "M" there is an increase on the original Estimate of £26,000. That additional sum is required in order to meet the growing needs of the Agricultural Research Council for research stations and administrative expenses and research purposes generally. Therefore, what this Vote really means is, first, that we are raising the status of the Agricultural Research Council and we are for the rest of the year giving it a larger sum than had been anticipated in the main Estimates. In any case, it will be getting those moneys not through the Development Commissioners but directly from the Vote, though that last point, in itself, as I have explained, does not make any real difference.

Sir Ernest Shepperson: May I ask whether these grants or any part of them will go to the agricultural colleges to assist them in carrying out their functions in connection with agricultural research ?

Captain Crookshank: Of course, there is an enormous number of grants and technically they come under the Department of the Lord President of the Council, as do other

* For a supplementary sum not exceeding £69,000.

scientific grants and I am merely answering for him at the moment. I do not know whether any of the sum which is dealt with in this Supplementary Estimate is going directly to the colleges. But these are, I understand, largely grants for work done through or by agents of the colleges—for instance, the School of Agriculture at Cambridge, the School of Animal Pathology at Cambridge, the Institute of Agricultural Parasitology, grant to Rothamsted, grant to Reading University and many others. I think this is the normal procedure under which the financing of this work is carried out and if there are any specific or detailed questions on which hon. Members require information, I think it would be more convenient if they were put down at Question time and dealt with by the Minister concerned.

Mr. Price (Forest of Dean): In the Class VI Vote in these Supplementary Estimates for the Ministry of Agriculture I find there are grants for agricultural research purposes involving an additional sum amounting to about £29,000. Do these grants not come under that head also?

Captain Crookshank: The hon. Member is referring to another Vote, and I am afraid I cannot answer for that. The Minister of Agriculture will deal with that Vote. What I am dealing with now is what is being done directly under the auspices of the Agricultural Research Council and the hon. Gentleman can rest assured, if this is what he has in mind, that these bodies do all work together.

Mr. Price: Into which class—the Vote we are dealing with now or the other Vote of the Ministry of Agriculture—do the grants to universities or research stations come?

Captain Crookshank: I think it will be clear from what I have said that they come into both. The instances which I quoted to my hon. Friend the Member for Leominster (Sir E. Shepperson) were grants which come out of this Vote. Obviously there are many other moneys provided for these purposes through the Ministry of Agriculture.

Mr. David Adams: In view of the growing importance of agricultural development as a result of the war and other causes, is the Minister satisfied that the amount now provided is sufficient to meet all these expanding purposes? I ask this question because, to my knowledge, scientific research generally in this country has been far behind that in other leading countries. That was certainly the case in pre-war days. It is a position which should be rectified and the present may be an opportunity of doing so, as far as agriculture is concerned.

Captain Crookshank: I think the Agricultural Research Council can be trusted to bring forward any proposals which are within its field and which it considers necessary at the present time. But this is a Supplementary Estimate and I am dealing only with the excess for which the House is being asked. I understand that the matters dealt with in this excess are largely research work on animal diseases, nutrition, and plants and soil.

Ministry of Agriculture and Fisheries.

The House also agreed payment of a supplementary sum (not exceeding £255,500) in respect of Class VI of the Estimates (Ministry of Agriculture and Fisheries), the Minister (Mr. R. S. Hudson) stating that an item of £133,000 was mainly accounted for by the increased expenditure caused by the outbreak of foot-and-mouth disease and to steps that had to be taken to conquer that disease.

In debate, Mr. Price: I see that there is a sum of £133,000 for animal diseases, and I see also that it mainly concerns expenses in connection with foot-and-mouth disease. But important as that disease is, there are others. If this sum covers only foot-and-mouth disease and a little swine fever, I must point out, as the Minister knows, that tuberculosis, Johne's disease and mastitis are very serious diseases of the dairying industry which are causing tremendous losses every year. I know the Minister has a scheme in hand which, owing to certain technical difficulties, cannot for the moment be put into operation, but I hope he will be able to give some assurance that something will be done. Although I do not want to see the sum raised unduly—we must all be careful in these times to see that money is not unnecessarily spent—I would like to see something more than an expenditure on foot-and-mouth disease.

As regards the amounts for agricultural research, the increases, I see, come to about £27,000. It is not easy in these times to carry on agricultural research, as the universities and research stations are having their staffs very much reduced and the younger people are being called up. But I hope this research work will be carried on. The agricultural industry is faced with special problems in war-time which were not present in peace-time, and it is, therefore, important to keep agricultural research going. For instance, the feeding-stuffs given to cattle now are different from what they were in peace-time. Much less is imported, and indeed, very little is imported; much more home-grown feeding-stuffs are used, and in my opinion this is much better for the animals. Further research is needed into the values of feeding-stuffs such as silage and the various home-grown things which we are producing. This research work through the Universities and research stations must be continued, and the Committee must not stint the money necessary for this work.

There is a reduction of £5,290 on the National Stud. Does this mean a general reduction in the work which the Ministry have done hitherto in improving livestock? The farming community has been much concerned because it has not been possible to get fees granted from the Ministry, as they were formerly granted in peace-time, to various societies which exist for the purpose of sending round stallions to improve the breed of horses. I do not think we can altogether ignore the horse in these days. It is an age of tractors, but even now the horse has enormous value. It is causing considerable concern to the farming community that nothing is now being done to keep alive the breeding of good cart horses. Does this reduction of £5,290 mean that nothing is to be done in this respect?

Mr. Hudson: The National Stud has nothing to do with cart horses.

Mr. David Adams: I should like to ask whether steps are being taken to expend moneys in improving the quality of low-grade farms, of which there are many thousands in the country. It is well known that our great local authorities have for long complained, through their local medical officers of health, of the quality of much of the milk coming into their districts.

The Deputy-Chairman: Milk does not come under the Supplementary Estimate.

Mr. Adams: Would I not be in order in asking that money should be expended for the purpose of improving the quality of farms?

The Deputy-Chairman: That would be out of order on this Supplementary Estimate.

Mr. Adams: Then I shall have to raise the matter in another way, because it is time it was raised. Diseases in cows are very prevalent indeed, and owing to the poverty of many of the farming community, there is no examination of their cows. The veterinary officers do not attend from one year to the next. Therefore, I want to ask the Minister whether he will schedule tuberculosis as being a liability on the community in such cases, so that herds which are notoriously tuberculous can be examined in the public interest.

Sir E. Shepperson: With regard to agricultural research, I understand that generous grants are being made to the various agricultural schools at Cambridge and also to Rothamsted and Fareham. I should like to have an assurance that the results of the activities of these various bodies are co-ordinated and that there is not overlapping in the research work which they are doing. I do not think it is possible to lay too great emphasis upon the value of agricultural research. Recently we have been told of the value of vitamins in order that we may get the greatest possible value out of the food we consume. Similar studies in regard to the values of foods which plants can absorb from the soil and the air are essential. To my mind, it is no good getting theoretical results from research unless those results can be practically applied. I understand that in various parts of the country the Ministry have established experimental farms where these results can be practically applied, and if that be the case, I should think it is the most valuable asset which the Ministry could present to agriculture at the present time.

The Joint Parliamentary Secretary to the Ministry of Agriculture (Mr. T. Williams): My hon. Friend the Member for Forest of Dean (Mr. Price) referred to diseases of animals—Johne's disease and tuberculosis—and I need hardly say that that is a matter which is receiving active consideration constantly. The amount of money that is made available for research into diseases of animals generally is

being increased rather than decreased all the time.

The second question related to Agricultural Research Expenses. It is obvious to anyone that this Supplementary Estimate has been increased, but, in spite of the continued increase to the Treasury, I think that the value to agriculture has also been increased. Next comes the question of the National Stud. This matter can be explained away in a few sentences. The National Stud bred two beautiful race-horses which were leased to His Majesty. They both won many races and added materially to the Exchequer. One of the horses was sold for a very good price at Newmarket, and I am hopeful that we shall be as fortunate again this year. My hon. Friend the Member for Consett (Mr. David Adams) referred to milk. That question is certainly worth consideration. He will remember, of course, that all milk premiums paid to farmers are intended to assist in clearing up tuberculosis and other diseases. It is a slow process, which I should like to see expedited, and I can assure my hon. Friend that no efforts will be spared in trying to safeguard the health of children and others.

Mr. David Adams: Is it intended to make the tuberculosis examination of cows a public charge?

Mr. Williams: That matter hardly comes within the scope of this Supplementary Estimate. As my hon. Friend knows, the cost of examination is borne jointly between two bodies, but it is rather a big question, and one can hardly deal with the whole field of animal diseases on this Vote. Agricultural research is co-ordinated by the Agricultural Research Council. Unfortunately, in the past there has been too long a gap between discovery and translation of discovery to the farmers. My right hon. Friend has recently set up an Agricultural Improvement Council, whose duty it is to see that as rapidly as possible the discoveries of scientists are handed on to the farmers. I am convinced that the revision which has taken place will be of inestimable value to agriculture, and that it will ensure that agriculture derives the maximum benefit from the researches of the "backroom boys" of agriculture.

NOTES AND NEWS

The Editor will be glad to receive items of professional interest for inclusion in these columns.

Diary of Events

Feb. 17th.—Adjourned Meeting of Council, N.V.M.A., at the Connaught Rooms, Great Queen Street, Kingsway, W.C.2, 11.30 a.m., to be followed by an Ordinary Meeting of Council.

Feb. 18th.—Meeting of the Comparative Section of the Royal Society of Medicine, at 1, Wimpole Street, W.1, 2.15 p.m. for 2.30 p.m.

Feb. 25th.—Annual General Meeting of the Lancashire Division, N.V.M.A., at Manchester, 2.15 p.m.

Feb. 26th.—Annual Meeting of the West of Scotland Division, N.V.M.A., at Glasgow, 2.45 p.m.

Mar. 4th.—Annual Meeting of the Scottish Metropolitan Division, N.V.M.A., at Edinburgh, 2.30 p.m.

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R.C.V.S. Central Library for Animal Diseases

Owing to air raid damage to the College Library many of the textbooks and periodicals have been removed from Red Lion Square to Harrogate, and some are being housed at Compton. It was hoped to continue the Library Service as far as possible, but requests for the loan of books and periodicals have decreased to such an extent as no longer to warrant the maintenance of the service. The Council has therefore decided to discontinue the loan of books, etc. from the Library until the end of the War.

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Refresher Tuition in Bovine Pregnancy Diagnosis and Treatment for Infertility

The attention of Members is drawn to the list given below of the names of the new 'Instructors' appointed to carry out refresher tuition as above in the under-mentioned areas respectively allocated to them:—

J. N. Bowen, M.R.C.V.S.—Bedfordshire, Huntingdonshire and Northamptonshire.

J. A. Brown, M.R.C.V.S.—Dumfriesshire, Lanarkshire, East-West-and-Midlothians, Clackmannanshire and Fifeshire, Stirlingshire and Dunbartonshire.

F. T. Day, F.R.C.V.S.—Cambridgeshire, Norfolk and Suffolk.

W. L. Dwerryhouse, M.R.C.V.S., D.V.S.M.—Essex, Hertfordshire, London and Middlesex.

T. N. Gold, M.R.C.V.S.—Cheshire and Lancashire.

S. Jennings, M.R.C.V.S.—Cornwall and Devon.

R. D. Mackintosh, B.V.Sc., M.R.C.V.S.—Argyllshire, Ayrshire, Butsshire and Renfrewshire.

J. McWilliam, M.R.C.V.S.—Angus, Kincardineshire, Aberdeenshire and Inverness-shire.

C. Weighton, M.R.C.V.S.—Berkshire, Buckinghamshire, Hampshire and Oxfordshire.

If there are any other members of the profession desirous of receiving this refresher tuition who have not yet sent in their names, it is still not too late to send them *now* to the General Secretary, N.V.M.A., 10, Bore Street, Lichfield, Staffs.

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R.C.V.S. OBITUARY

Bolton, Thomas, Church Street, Steyning, Sussex. Graduated London, July 5th, 1882. Died January 25th, 1942; aged 80 years.

Mr. Thomas Bolton, M.R.C.V.S.

For nearly half a century Mr. Thos. Bolton had been in practice in Steyning and district. His father was for a long period Member of Parliament for St. Pancras, and was subsequently a taxing officer at the Law Courts, while his grandfather was a Judge.

Mr. Bolton, who passed away three weeks after his wife, had done public service on the Parish Council and also as a sidesman at the Parish Church for many years. He was Veterinary Inspector at the Market. Mr. Herbert Bolton had been associated with his father in the practice for a considerable period. Mrs. Bolton rendered valued service to the Women's Institute and to the Women's Branch of the Conservative and Constitutional Association.

The Rev. E. W. Cox, Vicar of Steyning, officiated at the funeral service, at which Mr. H. S. Caldwell represented the Sussex Veterinary Society, and other members of the profession present were Mr. Pritchard, of Preston (Brighton), and Mr. Scott Dunn, of Hove.

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McKnight—In January, 1942, on active service in the Middle East, Wing Commander Cyril Thomas McKnight, Royal Air Force, the dearly-loved husband of Mary McKnight, M.R.C.V.S. (*née* Jaques) of Redgates, Tuddenham, Ipswich.

The above announcement of the grievous loss which has befallen one of our women graduates through the death of her husband on active service, will be read with deepest regret by all her colleagues in the profession, on whose behalf we extend sincerest sympathy to Mrs. McKnight in her bereavement.

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SCIENCE AND THE SERVICES

Sir Henry Tizard, proposing the "Parliamentary and Scientific Committee," on the occasion of the first annual luncheon of that body, at the Savoy Hotel, said the influence of science was greater than it had ever been and its tactical strength in this country was very high. Its strategical position in relation to the war was not so strong.

Who was to determine the strategy of science applied to war? The scientist working only with other scientists certainly could not; nor could the staffs of the fighting services without the intimate co-operation of scientists; nor could the War Cabinet, however gifted with ideas. What was wanted was the ever closer collaboration of scientists with the executive staffs of the fighting and other services. And the first thing that the scientist learned when he had the advantage of such collaboration was that he had a lot to learn.

The Royal Air Force had set a fine example of this intimate collaboration. Its technical needs, its staff plans, even its operations had been submitted freely to the scrutiny and criticism of scientists. A good dividend had resulted; so much so that its example had been followed by other services. But the infection had not yet spread widely or rapidly enough.

Lord Dudley, proposing the toast of the guests, stated that Lord Samuel had frequently emphasised the need for scientific representatives or observers on our diplomatic missions overseas. That development was already taking place. Perhaps committees similar to those in this country could be formed in the Dominions. If so they might usefully exchange material.

The company was widely representative of the scientific life of the Nation, and included leading figures in parliamentary, medical and agricultural circles and the administrative, technical and research departments of the Government and of the Services. The following members of the veterinary profession were present: Mr. H. E. Bywater (Hon. Treasurer, N.V.M.A.), Mr. D. A. E. Cabot (Chief Veterinary Officer, Ministry of Agriculture), Mr. R. C. G. Hancock (President-elect, N.V.M.A.), Mr. G. H. Livesey (Vice-President, R.C.V.S.), Professor Wm. C. Miller, Mr. John Smith (Adviser on Animal Health, Colonial Office), Dr. A. W. Stableforth, Mr. H. W. Steele-Bodger (Vice-President, N.V.M.A.) and Dr. W. R. Wooldridge (President, N.V.M.A. and Hon. Secretary of the Parliamentary and Scientific Committee).

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ROYAL ARMY VETERINARY CORPS

The following is an extract from the *London Gazette*, dated January 27th, 1942:—War Subs. Lt. E. A. Tutton (106918) from Lan. Fus., to be Lt. 11th Jan. 1942.

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NEED FOR INTENSIFIED WINTER MILK PRODUCTION

In a recently issued Press notice the Ministry of Agriculture point out that the consumption of milk has greatly increased, and proceed: "This is due partly to the special priorities provided by the Ministry of Food and partly to an ever-growing appreciation of the value of milk as a food. Milk is the basis of the National Health Scheme and of the arrangements made for the adequate nutrition of the people in time of war. Without proper nutrition all human endeavour must be enfeebled and national moral sapped. It is, therefore, essential that sufficient milk should be available at all seasons.

"Farmers, therefore, are urged to keep up, and even to increase, the milk supply. Already supplies in winter are insufficient to meet all the demands of the public. Before the war the producers of milk were not specially encouraged to develop winter milk production for the simple reason that the supplies at that season exceeded the demand for liquid consumption. Some of it had to be manufactured at prices much below the actual costs incurred. Now, when the demand for liquid milk has increased, the position is different and the great need is for a sufficient supply of winter milk. In summer the demand for liquid milk is likely to be fully met.

"In some areas, particularly in the east and south-east, producers had always supplied a high proportion of milk in winter, and in others, particularly in the west, most of the cows calved in the spring and supplies were high in summer and very low in winter. Conditions are now changed on most farms. Grass has been ploughed up and arable crops suitable for feeding to dairy cows in winter are being grown. Here then is the means for producing a much higher proportion of milk in winter when the need is greatest.

"There are certain advantages in producing winter milk. Home-grown foods produced from the new arable can be converted to profitable use. Not only are the prices of milk in winter considerably higher than those in summer, but herds producing a high proportion of milk in winter generally show higher yields than those maintained largely for summer production. The reason for this is that cows give most milk in the first few months of their lactation and "come again" under the stimulating influence of the spring flush. Animals calving about mid-winter are naturally able to respond better to spring grass than those calving in autumn.

"Intensified winter milk production is necessary to meet the needs of the consuming public and it is an integral part of the new dairy farming. Farmers, however, cannot change their systems immediately. Before they can produce more milk next winter they must have more cows and heifers calving in autumn and winter, and this needs arranging now. A special appeal is made to breeders and milk producers all over the country to see that more of their heifers and cows calve down in autumn or winter. If every producer has one extra heifer or cow calving in the autumn or winter, this might mean a difference to the milk supply of about a quarter of a million gallons of milk daily. Taking the supply over the country as a whole this would go far to remove any need for restricting supplies of milk next winter.

"Make your decisions now—and plan accordingly. Try to reduce the interval between calving and service to 6 or 8 weeks. Bull more heifers, even if it means their calving down at a younger age."

DISEASES OF ANIMALS ACTS, 1894 TO 1937, AND AGRICULTURE ACT, 1937 (PART IV).

Summary of Returns of Confirmed Outbreaks of Scheduled (Notifiable) Diseases

Period.	Anthrax.		Foot-and-Mouth Disease.		Parasitic§ Mange.		Sheep Scab.	Swine Fever.	
	Outbreaks confirmed.	Animals attacked.	Outbreaks confirmed.	Animals slaughtered as diseased or exposed to infection.	Outbreaks confirmed.	Animals attacked.	Outbreaks confirmed.	Outbreaks confirmed.	Swine slaughtered.
	No.	No.	No.	No.	No.	No.	No.	No.	No.
Period 16th to 31st Dec., 1941	12	12	—	—	1	2	44	24	13
Corresponding period in ...									
1940	20	24	42	3,303	—	7	31	170	115
1939	17	18	12	1,105	3	6	14	159	107
1938	36	39	11	1,123	—	—	14	54	23
Total 1st January to 31st Dec., 1941	399	470	264	27,037	21	56	255	1,088	530
Corresponding period in									
1940	564	677	160	19,058	19	47	228	5,019	3,561
1939	699	792	99	12,080	36	79	276	3,286	2,467
1938	830	1,235	190	24,012	46	76	222	951	743

NOTE.—The figures for the current year are approximate only. §Excluding outbreaks in Army Horses.

Tuberculosis (Attested Herds) Schemes

The number of Attested Herds, *i.e.*, herds officially certified as free from tuberculosis as at December 31st, 1941, was as follows:—ENGLAND 3,885 ... WALES 9,135 ... SCOTLAND 3,311 ... TOTAL (GREAT BRITAIN) 16,331